REMARKS

This Amendment is in response to the Office Action dated September 1, 2010. Applicant respectfully requests reconsideration and allowance of all pending claims in view of the above-amendments and the following remarks.

I.   CLAIM REJECTIONS – 35 USC § 103

Claims 1-13 were rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over the article V. Le Nir et al., "Reduced Complexity Space Time Block Coding and Decoding Schemes with Block Linear Precoding" in view of Ketchum, U.S. Publication No. 2003/0185310.

The Applicant respectfully disagrees, and considers that neither V. Le Nir, nor Ketchum discloses the idea of implementing a transposed space-time mapping, i.e. transmitting the symbols having undergone a precoding by a same column of a linear precoding matrix, on M transmit antennas. The specification defines a "transposed space-time mapping" as the sending of symbols having undergone the same precoding by column on the M antennas (Substitute Specification - clean version, page 3, lines 21-23).

The patentability of the present claims in view of the cited documents is discussed below.

A.   **V. Le Nir and M. Helard, "Reduced Complexity Space Time Block Coding and Decoding Schemes with Block Linear Precoding,"**

V. Le Nir et al. disclose a method which consists of combining linear precoding with Alamouti orthogonal space-time block coding, designed to improve the use of spatial diversity within a multi-antennas system.

V. Le Nir et al. neither disclose nor suggest the feature of Applicant's claim 1, which includes transmitting, from the different transmit antennas, the symbols that have undergone the same precoding by columns.

Moreover, the method disclosed in V. Le Nir et al. consists of using space-time codes which, contrarily to the present application, does not allow the benefit from the maximum

capacity of a MIMO channel.

The V. Le Nir et al. document is thus not relevant toward Applicant's claim 1 or the other independent claims.

B.   Ketchum (U.S. Publ. No. 2003/0185310 – QUALCOMM)

Ketchum discloses a method for precoding data for a multipath channel in a MIMO type communication system. According to this method, the precoding of the symbols depends on the channel response. The precoded symbols are then "preconditioned" according to an estimation of the MIMO channel response.

It should be noted that the "precoding" technique according to Ketchum is distinct from the "precoding" technique according to the present claims. More specifically, the precoding technique according to an exemplary embodiment of the present claims relies on the implementation of a matrix whose size is not linked to the multi-antennas system and which doesn't need knowledge of the transmission channel at the transmission side. This implies simplicity at the transmission and the reception sides. Moreover, the size of the matrix can be larger than the size of the multi-antennas system.

The precoding technique according to Ketchum is a pre-filtering technique, also called pre-equalization. The implementation of this technique needs knowledge of the transmission channel at the transmission side, and is linked to the size of the multi-antenna system. More precisely, the pre-filtering depends on the number of transmit antennas. The coefficients of the filter are determined from an estimation of the channel coefficients, using algorithms classically used in equalization technique.

Secondly, Ketchum does not disclose the idea of implementing a transposed space-time mapping of the symbols to be transmitted, i.e. transmitting the symbols having undergone the same precoding by column on the M transmit antennas.

Ketchum is therefore not relevant toward the present claims.

C.   Combination of V. Le Nir et al. and Ketchum

V. Le Nir et al. disclose the implementation of a linear precoding within a multi-antennas system, which is different from the precoding technique according to the present claims. Indeed, the "precoding" technique according to the present claims includes transmitting symbols which have undergone the same precoding by columns, on the different transmit antennas. This technique enables, for example a benefit from the full capacity of the MIMO system, without inducing increased complexity in reception.

Ketchum also discloses the use of a precoding technique within a multi-antennas system that is different from the precoding technique according to the present claims. Indeed, the "precoding" technique according to Ketchum is a pre-filtering or pre-equalization technique.

As a consequence, neither V. Le Nir, et al. nor Ketchum, discloses the idea of implementing a transposed space-time mapping, i.e. transmitting the symbols having undergone the same precoding by column on the M transmit antennas.

According to an example of the present claims, a source matrix formed by vectors to be transmitted (arranged in successive rows) is multiplied by a precoding matrix having a size greater than or equal to the number of transmit antennas, to form a precoded matrix. The M symbols forming a column of the precoded matrix (i.e., a precoded vector) undergoes a precoding by a same column of the linear precoding matrix and are sent simultaneously on the respective M antennas. Each of the symbols forming a same column of the precoded matrix is thus transmitted simultaneously on each of the transmit antennas, each antenna sending a different symbol from the column of the
precoded matrix.

Moreover, the problem to be solved by an exemplary embodiment is the conception of a transmission method enabling to make use of both the maximum capacity of the MIMO channel, and the maximum space-time diversity, without inducing increased complexity in reception. This technical problem does not find a solution in V. Le Nir et al. or in Ketchum.

Finally, the transmission of symbols subjected to the same precoding by columns (in other words, which have undergone the same precoding by columns) does not constitute a simple

arbitrary choice of the matrix determination, and has never been considered before.

The combination of documents V. Le Nir et al. and Ketchum is therefore not relevant toward the present claims.

Applicant respectfully requests that the rejection of claims 1-13 under §103(a) be withdrawn.

II.   CLAIM REJECTIONS – 35 USC §101

Claim 11 was rejected under 35 U.S.C. §101 as being directed to a "signal", which is currently considered by the USPTO to be non-statutory subject matter.

With this amendment, claim 11 is amended from "a signal" to "a method", which is considered statutory subject matter under §101.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

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